Conferences

JULY 21ST, 2004

PRE-001 - The use of surgical laser in Dentistry and dental bleaching

Carmo Antônio Aun

Several aspects involving the use of lasers in Dentistry will be addressed, especially in Endodontics, including basic and advanced topics, history, technique and present scientific productions.

PRE-001 - The use of surgical laser in Dentistry and dental bleaching

Melissa Andréia Marchesan

Dissemination of blood into the dentinal tubules caused by pulp extirpation or traumatically induced internal pulp bleeding is a possible cause of discoloration of non-vital teeth. Discolored teeth, especially in the anterior region, can result in considerable cosmetic impairment. The whitening of these teeth is an alternative therapeutic method that is re latively non-invasive and conserves dental hard tissue. Currently, intracoronal bleaching of pulpless discolored teeth can be performed with the association of laser irradiation to hydrogen and carbamide peroxide and can even be accomplished in one session. This report shows a clinical case of an endodontically treated tooth submitted to bleaching using LED light and infrared LLLT therapy.

PRE-001 - The use of surgical laser in Dentistry and dental bleaching

Carla Raquel Fontana

Some of the clinical applications of surgical lasers in Periodontics will be shown.

PRE-002 - Lasertherapy in Dentistry

Thereza Christinna C. G. P. Ladalardo

Evaluation and treatment of neurosensory alterations derived from surgical procedures in Dentistry

PRE-002 - Lasertherapy in Dentistry

Márcia Martins Marques

Lasertherapy in vitro. The effects of defocused mode low and high power lasers on cultured cells in vitro will be addressed. It is known low power laser has biostimulating effects on cells and tissues. In this course, some study models will be presented, with special emphasis to cell proliferation and protein production induced by laser irradiation in cells derived from dental tissues.

PRE-002 - Lasertherapy in Dentistry

Walter João Genovese

This course will address the main physical properties of laser energy and its use in Dentistry. Low power or therapeutic laser and high power or surgical laser will be discussed.

JULY 22nd , 2004

CON-001- Past, presente and future of laser in Dentistry

Loh Hong Sai

CON-001 - Erbium: YAG laser in periodontal procedures

Isao Ishikawa

Since lasers were introduced for the treatment of oral diseases, there has been considerable advancement in technology. As a result, numerous laser systems are currently available for oral use. The Er:YAG laser possesses suitable characteristics for oral soft and hard tissue ablation. Recently, it has been applied for effective elimination of granulation tissue, gingival melanin pigmentation and gingival discoloration. Contouring and cutting of bone with minimal damage and even or faster healing can also be performed with this laser. In addition, irradiation with the Er:YAG laser has a bactericidal effect with reduction of lipopolysaccharide, high ability of plaque and calculus

removal, with the effect limited to a very thin layer of the surface and is effective for implant maintenance. In this lecture, I will talk about the positive characteristics of the Er:YAG laser that indicate its potential as a new treatment modality in periodontics.

CON-001 - Laser Welding in Dentistry

Takehito Minamizato

The are a lot of advantages of laser welding compared with conventional soldering method. Even inexperienced and unskiled dental technician can perform complicated technique by this welding method. Laser welding also reduces the working time for technical works. Soldering procedure involves multiple steps and cach step may cause error. In contrast, laser welding can be performed on the working model and results in accurate fitness. In case of welding, mother metal itself is molten and solidifies. This means high joint strength and low risk of corrosion compared with soldered joint that contains solder. This technique is thought to be essential to increase the use of titanium in dental fieht that has higt biocompatibility. Using this technique, it is possible to use different alloys in combination. Accordingly, development of new technique and new appliance is expectable with this welding method.
In this report, clinical application of laser welding is introduced which include bridge, denture, implant, denture repair etc. Laser welding is based on the interaction bet--ween laser beam and materials. Result of welding is affected by a number of parameters that regard laser beam and materials. Suitable beam condition and irradiation methods for the seccessful weld are introduced.

CON-002 - Er,Cr:YSGG laser and adhesion

A.J. España Tost

Since Er:YAG and Er,Cr:YSGG lasers were introduced in the restaurative dental treatments as a valuable tool, several studies have been published about adhesion mechanism in the irradiated teeth.
There are too many parameters that are hardly controlled when evaluating the adhesion between the bonding material and the dentin with the standard bond strength tests. In order to avoid these limitations, we have design study protocols based on the indirect evaluation of the bonding material-dentin complex, as well as the standard tests for direct measurement of the bond strength.
One of the elements that contribute to create the adhesion complex, is the resin penetrating through the dentin tubuli, and which is called tag.
Preceding studies, disclose that length of the resin tags dramatically influence on the bond strength rates, being directly proportional.
The present study compares measurement of the resin tags appeared in irradiated teeth with Er,Cr:YSGG and those developed with conventional handpiece, as well as differences of bond strength rates between these two groups.

CON-002 - Enamel fluoridation by means of Argon Laser

Samir Nammour

The presence of fluoride in enamel reduces the solubility of Hydroxyapatite to acid attack. The aim of these in vivo and in vivo studies is to increase significantly the enamel retention of fluoride by means of low energy density Argon Laser in order to prevent, potentially, the enamel caries appearance. For in vivo study, The 80 teeth coming from 12 patients were randomly divided into two groups of 40 each. EF group: teeth were only treated by fluoride gel. EFL group: teeth were treated the same way as in the EF group but they were lased after fluoridation. For the in vitro study, we prepared 400 enamel samples coming from 220 freshly extracted human teeth. The samples were randomly divided into two groups of 200 each. EF group: enamel samples were only treated by fluoride gel and submerged in distilled water for 7 days in the aim to remove the adsorbed fluoride from the enamel surface by osmosis process. EFL group: enamel samples were treated the same way as in the EF group but they were lased after fluoridation. All the teeth and samples were analyzed by protons beam delivered by a Tandem accelerator (PI E: Particle Induced Gamma-ray Emission). Quantitative analysis of fluoride was achieved by comparing with reference materials irradiated in the same geometrical assembly. The fluoride content of enamel surface was indeed not homogeneous and it was necessary to analyze the same enamel area after each treat-

ment. Each tooth or sample was maintained in a fixed target holder which was designed to irradiate the tooth enamel surface at the same place (1 mm²) after various treatments: sound enamel, enamel treated with fluoride gel (5 minutes application of fluoride gel on enamel followed by 1 minute rinsing with distilled water), lased enamel (low energy density Argon laser beam 10.74 J/ cm² for 30 sec.) and 7 days later in the aim to verify the presence of adsorbed fluoride on enamel surface. The effective analyzed enamel surface is 1 mm² and around 20 µm in depth. The results of in vitro study and after 7 days of submersion in distilled water showed that the lased enamel still retained 1533 ± 162.810 ppm of the fluoride carried after fluoridation process in contrast to the unlased enamel that lost all carried fluoride 0 ppm. The results of in vivo study and after 7 days, 6 months and 18 months showed that the lased and fluoridated enamel still retained respectively: 42.29 %, 13 % and 12 % of the fluoride carried after fluoridation process whereas the unlased enamel retained 12.25 % , 3 % and 0 % of carried fluoride. The difference is statistically significant between the fluoride retention of lased and unlased enamel. We concluded that the use of Argon laser at low energy density increases significantly the fluoride retention in lased enamel. The combination of topical application of fluoride gel and Argon laser beam may be considered as one of alternative clinical procedures for immediate enamel fluoridation and, potentially, for caries prevention. This procedure may be done easily in dental clinic. Furthermore, the use of low energy density of Argon laser beam is commonly accepted to be harmless for dental vitality.

CON-003 - Laser supported Dentistry - The way into future

Wolfgang Sperr

From the early beginning of the use of the laser technology for dental treatments with only a few indications the rang of possibilities has widened up and nowadays spread over nearly all different parts of Dentistry.

Coming from the general surgery soft tissue treatment was no problem if the right wavelength was used for cutting, coagulating or to make use of the germ reducing effect.

Today the positive effect of laser supported treatment in nearly all fields of the Dentistry shows very impressive that the importance of the use of the different lasers with their special qualities and wavelength are irreplaceable. The therapy of hypersensitive dental necks, the conditioning effect in combination with Composite Material not only for filling cavities but also for sealing dental fissures, the preparation of hard dental tissue in a nearly painless and silent way and of course the results in the field of endodontology are telling us that there is no way without this technology. But we always have to be very careful when we are setting the adjustment of our laser equipments for the special indications. Comparing the treatment results of conventional and laser supported therapies we can see, that we should prefer the advantages of laser supported Dentistry more and more.

Last but not least we see great progress in the use of laser when we try bleaching and do not want to destroy the enamel surface as it happened in the beginning of this trend.

CON-003 - Structural and cellular biology of laser wound repair

Marita Luomanen

Wound healing is a complex and dynamic process which is initiated by the injury. It is the response of the host for restoration of tissue integrity and involves coordinated cell activation, cell division, chemotaxis, migration, proliferation and differentiation.

Wound healing can be divided into distinct phases characterized by predominant cellular population and cellular function. It seems that wound healing follows a conserved sequence of events which partly overlap each other in time. The phases include early and late inflammation, re-epithelialization and granulation tissue formation, matrix formation and finally the connective tissue remodelling which can result in connective tissue scarring.

Different lasers offer different tissue coagulation and cutting properties. CO2 laser light of 10.6 ?m wavelength is highly absorbed by tissue water irrespective of pigmentation. On the other hand, the absorption of Nd:YAG laser beam of 1.06 ?m without a synthetic working tip by tissue is more dependent on pigmentation and the target can be demolished through coagulation. The immediate outlook of laser wounds differs from scalpel-induced wounds. Laser incisions are in general dry and can have a superficially charred appearance. A laser cut can be made more precise and superficial than a corresponding cut with a scalpel. The ultrastructural alterations caused by heat for-

mation can be limited to a narrow tissue zone surrounding the wound cavity. Remarkable is that some cellular structures seem to be more resistant against laser-caused tissue disruption. In the epithelium desmosomes, the intercellular junctions and in the basement membranes laminin-containing structures have shown to be the most resistant cell components against laser treatment. Re-epithelialization of a laser wound is seen to begin within hours after surgery. Proliferating keratinocytes in the epithelium use the desmosomes to bind with each other and the laser-resistant extracellular protein remnants at the edges of the wound for cell migration. An interesting finding is also that with laser surgery the connective tissue cells can be destroyed and still leave some of the connective tissue fibrillar framework proteins biologically viable.
In spite of the slightly slower capillary proliferation, inflammatory response, re-epithelialization and connective tissue repair laser wounds tend to heal with less connective tissue scarring and contraction than corresponding scalpel wounds. Once the wound is filled with granulation tissue and covered with a neoepithelium, fibroblasts transform into myofibroblasts. The appearance of the transformed fibroblasts that correspond to the connective tissue compaction and contraction is less in the laser wounds. The different cellular structures and extracellular fibrillar proteins can be made visible to the eye by using immunohistochemical staining methods.

CON-003 - The reality of laser and LEDs in Brazil: Therapeutic, surgical and dental bleaching

Luciano Artioli Moreira

The use of laser in Brazil has been increasingly growing in the last years. Scientific and technological advancements provide now more applications in Dentistry. Low power laser has been widely used, offering analgesic, anti-inflammatory and bio-stimulating effects. There is a variety of Brazilian equipment at accessible cost. Today, the association of LEDs for dental bleaching meets the great esthetic demand.

CON-004 - Effects and benefits of the laser application in the periodontal treatment

George Romanos

The use of the modern laser technology can be used in different surgical applications in the periodontium (i.e. excision of gingival hyperplasias, gingival tumours etc.), reduction of the periodontopathogenic bacteria as well as the epithelium removal.
Using the correct laser wavelength it is possible today to remove the hard deposits, to decontaminate the inflamed periodontal tissues and to enhance the periodontal regeneration. Clinical applications will be presented and discussed related to the recent literature.
Furthermore, the laser technology will be presented in the field of the modern Implant dentistry. The treatment of periimplantitis and the decontamination of the different implant surfaces present new horizons in dentistry. According to the research findings we are able to illustrate the treatment concept. Future developments and possibilities for the clinician may be demonstrated in order to describe the benefits of the laser application in the periodontal treatment.

JULY 23rd,2004

CON-005 - Lasertherapy and bone regenaration

Marleny Elizabeth. M.M. Gerbi

The aim of the present investigation was to assess histologically the effect of Lasertherapy (AsGaAl, 830nm, 40mW, CW, ~0,6mm, 16J/cm2 per session, divided into four points of 4J/cm2) on the repair of surgical defects created in the femur of the Wistar rat. The defects were filled to bone morphogenetic protein (Gen-pro , bBMPs) associated or not to GTR (Gen-derm). Surgical bone defects were created in n=60, divided into five groups: Group I (control - n=12); Group II (Laser - n=12); Group III (bBMPs - n=12); Group IV (bBMPs+ Laser - n=12); Group V (bBMPs+ Membrane - n=12); Group VI (bBMPs+ Membrane + Laser - n=12). The animals on the irradiated groups received the first irradiation immediately after surgery and repeated seven times at every 48h. The animals were sacrificed after 15, 21 and 30 days. The results showed histological evidence of improved amount of collagen fibers (15, 21 days) and increased amount of well organized bone trabec-

ulae at the end of the experimental period (30 days) on irradiated animals compared to non irradiated ones. It is concluded that a positive biomodulative effect on the healing process of one defects associated or not to the use of bBMPs and biological membrane on the femur of the rat.

CON-005 - New aspects of in hard tissue treatment with Er:YAG lasers

Nobert Gutknecht

When first experiments with Er:YAG lasers on dental hard tissue in the year 1988 were made, scientists mainly concentrated on the thermomechanical interaction of dental hard tissue. Having only one specific pulse wideness, researchers concentrated mainly on small Hz rates and high mJ rates to avoid thermal damages in the pulp. To increase preparation speed, Hz rates increased and mJ rates decreased.
The aim of our study was to investigate the influence of the temporal length of the applied laser pulses on ablation threshold of human enamel. Therefor a total of 600 laser irradiations were performed with an Er:YAG laser system (= 2940 nm) on 50 extracted wisdom teeth. The laser light was coupled into a fluoride glass fiber to ensure a nearly gaussian distribution and radial symmetry of the beam. The beam diameter on the sample was 610 µm. The energy density on the surface of the teeth was increased from 2 to 20 J/cm2, while pulse length was varied from 100 µs to 1000 µs for each energy density. The surface changes were assessed by means of reflected-light microscopy.
The examinations showed that the pulse length and the energy density have a statistically significant influence on the ablation threshold (logistic regression, $p < 0.0001$).

CON-005 - Evolution of the use of the laser in Endodontics

Carlos Eduardo Aun

No final dos anos 80, as dúvidas eram muitas e as investigações foram iniciadas e perduram até os dias atuais. No decorrer destes muito se descartou, porém o conhecimento obtido soma-se às técnicas endodônticas atuais em busca da resolução dos casos mais complicados e refratários.

CON-006 - Er:YAG laser ablation - a 5 year follow-up

Tatjana Dostálová

The Er:YAG laser at 2940 nm has been proposed for use in dental cavity preparation and removal of carious enamel and dentin. This laser removes mineralized dental tissue by thermally induced microexplosions of the water molecules within the mineral. The temperature rises within the pulp, and subsequent pulp irritation can be prevented if pulse repetition rates of 1 - 4 Hz with pulse energies of 100 ml to 500 mJ are used with water spray. The reduction of noise and vibrations for the laser ablation in comparison with the conventional dental drill, as well as the reduced need for local anesthetic, suggest that the Er:YAG laser would be a useful tool for caries removal in children and mainly in adult frontal permanent teeth, so thus Er:YAG laser has been suggested as well suited for the removal of dental caries and for hard tissue cavity preparation. The clinical study using a 2940 nm Er:YAG laser indicated the Er:YAG safety and effectiveness of this laser in a clinical setting. The purpose of the present contribution is to determine the effect of the Er:YAG laser ablation in treating 150 dental caries after a period of 5 year. The esthetic appearance of composite resin is better than the esthetic effect of glassionomer cement. The retentive effect and stability of all the fillings materials used were the same. The qualities in laser cavities were very stable in cavities class I., III and V. Laser ablation versus classical drilling preparation is demonstrated with the same results.

Laser dental bleaching

The patient awareness of options available in changing the color of natural dentition has created an increase in public demand. The bleaching corrects or improves the color of teeth, and it is also the least expensive esthetic treatment option. Bleaching techniques involve a broad spectrum approach utilizing hydrogen peroxide (3- 38 %) with or without heat or laser, carbamide peroxide (10-30 %), or mixture of sodium perborate and hydrogen peroxide. The contribution describes the experience with laser-activated (infra red diode laser, wavelength 790 nm; power 40 mW, and eight light emission diodes, wavelength 467 nm P = 4 000 milicandelas each (Kondortech, Sao Carlos, Br) and diode laser, wavelength 970 nm, (university prototype)

power 40 mW) bleaching agent (Ultradent Opalescence X Extra Boost) for discolored teeth. The objective of laser bleaching is to achieve the ultimate power bleaching process using the most efficient energy source, while avoiding any adverse effect. The selective diode laser radiation can decrease the time of bleaching without the surface modification.

CON-006 - Dental Bleaching using laser and blue Leds

Fátima Antonia Aparecida Zanin

Scientific knowledge associated to the practice of the conventional Dentistry is essential for the safe usage of lasers. From the literature is possible to verify that photo-assisted dental bleaching has progressed throughout the time mainly on the photo-activator light/heat sources . Initially the activation of the gel was carried out by means of the use of heat sources such as instruments and lamps (photoflood, Halogen lamps) However, the high penetration of the 35% Hydrogen peroxide associated to the increased local temperature caused by the heating source, results on the increase of the tooth sensitivity. Because of this, the techniques used nowadays seek less time for application, less heating and decrease on the post-operative tooth hypersensitivity .On bleaching, several types of lasers may be used for the activation of the gel (Argon and Diodes) or can also be used on the treatment of the hypersensivity, which usually follows the bleaching performed by both infra red laser (low level laser) and blue LEDs. The use of the Argon laser and blue LEDs allowed the use of more concentrated bleaching gel which has no need for heating as
it is photochemically activated. Their use also improved the results of the bleaching; reduced the temperature during the procedure and consequently reduced the tooth sensitivy.

CON-007 - Detection of caries and subgingival calculus with fluorescence light and controlled selective laser removal

Robert Gall

The traditional diagnostics of caries and subgingival calculus show low sensitivity. New detection systems, which work with fluorescence light, have the ability to recognize caries at an early stage and under sound enamel. Even very small subgingival calculus can be detected with this device, due to the high fluorescence of calcified plaque. The sensitivity of this fluorescence detection system is much higher than the conservative methods. Furthermore it is well known that the wavelength of the Er:YAG laser has the ability to remove caries and subgingival calculus, a fact which has been proved through many different in vitro and in vivo studies. The combination of the fluorescence detection system and an Er:YAG laser makes it possible to selectively remove dentine caries and subgingival calculus. Dentine and cementum are conserved because the fluorescence signals of these sound substances are below the threshold value.

CON-007 - Research on lasers in Endontics: State of the art

José Luiz Lage-Marques

CON-007
Application of the Er:YAG laser for esthetic management of periodontal soft tissues

Akira Aoki

Periodontal soft tissue diseases often affect the esthetic appearance of patients. Management of these conditions is generally complicated and requires delicate techniques in order to improve the postoperative esthetics. Recently, use of lasers has been generally approved for soft tissue surgery. Especially, the Er:YAG laser was newly developed for use in dentistry.

At a wavelength of 2940 nm, this laser is highly absorbed by water, and thus shows excellent ablation of both soft and hard biological tissues. Compared to other laser systems, this laser has extremely lower thermal side effects, and has become one of the most promising lasers for periodontal therapy. Due to its superior qualities, this laser would be very useful and safe for periodontal minor soft tissue management, especially for delicate esthetic procedures.

The application of the Er:YAG laser, sometimes in combination with a surgical microscope, renders the procedure more feasible. It becomes possible to deal with the soft tissues more delicately, thus yielding more satisfactory results compared to those obtained by conventional methods.

This presentation includes our basic studies and the current clinical applications of Er:YAG laser for esthetic management of periodontal soft tissue diseases such as periodontal pockets, gingival enlargement and gingival melanin / metal (tattoo) pigmentation.

CON-008 - The laser assisted prosthetic treatments in dentistry

Francesco Saverio Martelli

Since the beginning of our experience with lasers, that started 10 years ago, we tried to use the different wave lengths in prosthetics.
The use in vestibuloplasty was already known and described from many authors, but we did not find any paper about the use in marginal tissue conditioning when we take the impression for crowns or bridges.
The marginal tissue treatment is the critical point in this procedure for several reasons: first of all we need the best vision when we finish our preparation, than we need to transfer to the technician the correct informations and finally we need a long terms stable marginal gum and a good relation with the crown.
To achieve these targets we need a dry and not bleeding soft tissue during the preparation and the impression, and no damage in the periodontal ligament, in order to avoid the recessions.
The last 8 years of experience demonstrated us that the Nd : YAG conditioning is a 100 % safety, procedure without any risk of recession and wonderful and stable aesthetics results.

CON-008 - Biomodulatory effect of laserthe-rapy - Clinical indications in Dentistry

Aldo Brugnera Júnior

LLLT helps the body to resume its self-balance, biomodulating inflammatory responses and allowing evolution towards cure in a shorter period of time. Pain control has historically been the greatest clinical indication for therapeutic Laser. Its analgesic action is the result of preventing the formation of the action potential or the peripheral nerve affecting the conduction of the nervous stimulus. The interruption of transmission of the impulses evoked in the nociceptors to the spinal cord is the neurophysiological mechanism on which the analgesic therapeutic action of Laser is based. Lasertherapy has been
used very successfully in clinical dentistry. Its methodology is simple, low cost and it can be integrated as auxiliary coadjuvant therapy to conventional treatments, or used in isolation in an elective manner in some pathologies. It is of great help in professional practice in association with almost all dentistry specialties, considering that the
following organic responses arise from aggressive agents: mechanical, chemical or biological, generating an inflammatory response, in most cases accompanied by painful symptom. The therapeutic effects of LLLT are summed up as: Anti-inflammatory, Analgesic, Tissue repairing. A substantial increase in interest in the therapy has been noted in scientific circles due to the significant number of satisfactory results with this therapy. The cost benefit relation of Lasertherapy for the professional is very satisfactory, and this type of laser could be another important therapeutic aid in general clinical practice.

CON-008 - Phototherapy is effective to improve wound healing of cutaneous wounds on nourished and undernourished Wistar rats

Antônio Luiz Barbosa Pinheiro

A wound represents the interruption of the continuity of tissue that is followed by damage or cellular death. Wound healing occurs due to a competitive mechanism between the synthesis and lysis of collagen. Any factor that increases collagen lysis or reduces its synthesis may result in changes in the healing process, i.e., nutritional deficiencies.
Phototherapies have been suggested as an effective method to improve wound healing. This study evaluated, histologically, the differences in the healing of cutaneous wounds in nourished or undernourished rats following laser therapy or illumination by polarized light. Fifty nourished or undernourished Wistar rats had a standardized wound created
on the dorsum and were divided into 6 subgroups: Group 1 - Control (standard diet; n=5); Group 2 - Control (DBR; n=5); Group 3 - Standard diet + laser therapy (l635nm; 20J/cm2, n=5; or 40J/cm2, n=5); Group 4 - Standard diet + Bioptron® (l400-2000nm; 20J/cm2, n=5 or 40 J/cm2, n=5); Group 5 - DBR + laser therapy (l635nm; 20J/cm2, n=5 or 40J/cm2, n=5); Group 6 - DBR + Bioptron® (l400-2000nm; 20J/cm2,

n=5 or 40 J/cm2, n=5). The first application of the treatment was carried out immediately after surgery and repeated at every 24 h during 7 days. Specimen were routinely processed (wax, cut andstained with H&E and Picrosirius stain) and analyzed under light microscopy. Analysis included: re-epithelization, inflammatory infiltrate, and fibroblastic proliferation.

Picrosirius stained slides were used perform descriptive analysis of the collagen fibers. The results showed the best results for nourished and undernourished groups treated with polarized light at a dose of 20J/cm2 and the undernourished groups irradiated with the laser light. It is concluded that the nutritional status influenced the progression of the healing process as well as the quality of the healed tissue and that the use of both modalities of phototherapy resulted in a positive biomodulatory effect in both nourished and undernourished subjects. The effect of the polarized light was more evident in nourished subjects and laser therapy more effective in the treatment of undernourished subjects, in both cases with a dose of 20J/cm2.

JULY 24TH, 2004

CON-009 - Fifiteen-year practice on research, clinic and teaching in laser technology dentistry

Carlos de Paula Eduardo

Fifteen years ago, by means of a project designated as BID USP 1989/90, two professors of the University of São Paulo (FOUSP,Brasil) had na opportunity of staying at the KyushuUniversity (Japan) with Professor Monoka for studying and learning to develop researches in the area of Lasers in Dentistry. Dunng this stay, they could follow the improvement of many prototypes, like the one of Er.YAG Laser. In 1992, at the ISLD Meeting at Salt Lake (USA), we could see cavity preparation performed with the TEA Co2 Laser. By that time, some researches with Nd: YAG Laser were aiready on the way in LELO/FOUSP. Two years later (1994), this Er.YAG Laser become to be launched in the market, increasing even more the several dentistry specialties where they could be used. In 1995, by the inauguration of the first Special Laboratory of Laser in Dentistry (LELO/FOUSP), we had already many professors and graduate students working in this area of great fascination in 1999 we have increased our facilities and in 2002 the currently designated Center of Research, Teaching and Clinic of Lasers in Dentistry atready had 15 high intensity lasers, more than 10 low intensity lasers and some LED'S for dental bleaching as well LELO/FOUSP offers activities worldwide recognized: Post-Graduate disciplines, Professional Master Course Lasers in Dentistry (IPEN/FOUSP), Students Interchange Program (University of Aachen/University of São Paulo) and International Program for foreign students and professionals. The laboratory is regulary visited by students and professionals from all over the world, mainly from Latin America LELO'S research group has already produced over than 150 theses in the laser field and many more scientific works are expected to be released in the forthcoming years. Theses and studies embracing most of the laser wavelengths used in dentistry have been tested with the intent of future clinic use and publication in high impact journals. It is important to mention that all the lasers procedures, both in vitro and in vivo., follow strictly the international safety rules and all the research projects are accomplished under the aprproval of a Research Ethics Commttee. In the last 15 years, the evolution of research and clinics of Lasers in Dentistry represented for sure the upgrade that we can have for the several dental specialities.

CON-009 - Laser and Pediatric Dentistry

Marina C. Vitale

The purpose of this presentation is an overview of clinical protocols and possible applications of different laser systems in main pediatric dental fields : diagnosis, prevention, restorative dentistry, traumatology, oral surgery.

We must remember that, in pediatric dentistry, every pedodontist should be a good psychologist: in fact, excellent therapeutic results depend on methods of approach, applied techniques and timing . Sensibility, technique , time are required to understand children's world . Nowadays, laser therapy represents a new strategy in pedodontics. Fluorescence laser system is a very effective system to detect early dental lesions and it is commercially available with a reasonable price. The Er:YAG is a promising device and could be preferred to conventional cavity preparation systems not only because it is more comfort-

able for children, but also for the variety of indications. The Er:YAG laser is recommended for pedodontics, dental trauma injuries, orthodontics and pediatric oral surgery. Nevertheless, in this last application , CO2 laser is preferred for its properties of coagulation and haemostasis . The Laser enables to complete routine dental procedures, making them simpler and reducing operating time in some clinical situations and improving the outcome in others. Conventional treatments can be replaced and better results obtained. Finally, laser has proven to offer new treatment opportunities that were not available in the dental field in the past.

CON-010 - Treatment of periodontitis and peri-implantitis with an Er:YAG laser - Evaluation of experimental and clinical studies.

Frank Schwarz

In addition to conventional treatment modalities (mechanical and chemical), the use of different lasers has been increasingly proposed for treatment of periodontal and peri-implant infections. Results from both basic and controlled clinical studies have pointed to the high potential of the Er:YAG laser. Its excellent ability to effectively ablate bacterial plaque biofilms and dental calculus without producing major thermal side-effects to adjacent tissue has been demonstrated in numerous studies. The aim of the present presentation is to evaluate, based on the currently available evidence, the use of an Er:YAG laser for treatment of periodontitis and peri-implantitis in comparison to conventional treatment approaches.

CON-010 - A new Er:YAG laser technology - possibilities for a dental chair integration

Friedrich Lampert

The history of development of Er:YAG lasers used for the preparation of dental hard tissues has gone a long way. From big systems with a low performance, low preparation speed and long pulse lengths to modern ones with high repetition rates and superior performance it has already been a long way. In this presentation, possibilities for further development of Erbium Systems are discussed as now after the lasers are technically mature other points like ergonomics become most important. The evolution from articulated arms to flexible fibers and miniaturization of the laser heads and dental chair integration are presented.

CON-011 - Lasertherapy for treating dental hypersensibility

Thereza Christinna G. P. Ladalardo

The aim of this study was to evaluate the effectiveness of two types of lasers (red, 660nm wavelength, and infrared of 830nm wavelength) as dentine desensitizers, as well as the therapeutic effects both immediate and late in individuals aged from 25 to 45 years. Cervical dentine hypersensitivity is the most frequent complaint among the odontalgias reported. A total of 40 teeth with cervical exposure were treated in four sessions. They were divided into two groups according to the treatment applied. A red diode laser of 660nm wavelength and infrared diode laser of 830nm wavelength were used. Dentine sensitive responses to cold nociceptive stimulus were evaluated by means of a pain numerical scale from zero to 10 before each treatment session, at 15 and 30 minutes after irradiation, and in a follow-up period of 15, 30 and 60 days after the end of treatment. Significant levels of dentinal desensitization were only found in laser treated patients with age ranging from 25 to 35 years. The 660nm red diode laser proved to be more effective than the 830nm infrared one. A higher level of desensitization was observed at the 15 and 30 minute examination post-irradiation. The 660nm red diode laser is effective as a dentine desensitizer in patients aged from 25 to 35 years. Its therapeutic effects both immediate and late are more evident compared with those relating to the 830nm infrared diode laser, concerning patients in different age groups.

CON-011 - Immunohistochemical and ultrastructural studies in healing laser excision wounds

Tony Zeinoun

The purpose of this presentation is an overview of the different studies of healing Laser Wound with specific consideration of the role of myofibroblasts and Eosinophil cell. Myofibroblasts and Eosinophils cell in healing laser excision wounds were evaluated in 96 rats tongue mucosa (Sprague

Dawley) for a period of 30 days. The Laser wounds were made in the right side of the midline of the tongue.
Specimens for immunohistochemical and histological evaluation were taken at day 0,1,2,3,4,5,6,7,8,9,10,14,17,-22,26,30,after surgery .
The Immunohistochemical and Ultrastructural studies have been done at research Laboratory of Electron Microscopy at University of Brussels Belgium and the institute of Biomedicine at University of Helsinki-Finland.
In these studies, we specify and determine their role and the process of contraction of wounds comparatively to conventional methods, and the concordance of the results with clinical treatments.

CON-011 - Hard tissue Laser interaction

Leonardo Stiberman

The laser - biological tissues interaction involves basically two components: What´s happen with the incident light and what´s happen in the target tissue.
Biological tissues aren´t homegenous from optical point of view and for that reason the incident light can be absorbed, reflected, dispersed or scattered.
When light is absorbed in the target tissue, the effects can be variable depending of the wavelenght used and the histological composition of the tissue, specially the cromophores, responsible of the selective absorption in each tissue, because of the laser monochromaticity.
In general, small wavelenghts are absorbed by pigmented tissues.
Argon laser, for example, has a great affinity for melanine and hemoglobine, so it´s indication is to work in soft tissues.
However, higher wavelenghts, around 3000nm like Erbium laser, have absorption peaks in water and hydroxiapatite and for that reason, they are indicated specifically to work in hard dental tissues.
Laser dentistry takes this photobiological effects to achieve therapeutic effects and is very important to know this to choose the correct wavelenght for specific work as we need in the daily dental practice.